

Claiming:

1. A method of forwarding information packets operating on a multiple element computer system having primary and secondary computing elements, said method comprising:
providing a multiple element computing system having a primary computing element and a secondary computing element in operative communication with each other;
5 building a table comprised of a plurality of entries with addresses associated therewith wherein said entries are organized hierarchically according to an LC-Trie compression algorithm operating on said addresses;
receiving an information packet within said computer system wherein said information packet has a destination address associated therewith;
10 searching said table using an LC-Trie search algorithm to find a match between said address of an entry in said table and said destination address of said information packet;
transmitting said information packet to a forwarding address associated with said address of said matching entry; and
wherein said steps of said method are performed by a forwarding table manager
15 application running on said primary and said secondary computing elements.

2. The invention in accordance with claim 1 wherein said table comprises an LC-Trie search table and a next-hop table associated together, wherein said LC-Trie search table comprises information from said LC-Trie compression algorithm, and wherein said next-

hop table comprises information necessary to transmit said information packet to said forwarding address associated with said matching entry.

3. The invention in accordance with claim 2 wherein said LC-Trie search table entries comprise a branching factor, a skip value, and an LC-Trie/Next-Hop Offset generated for each of said plurality of entries by said LC-Trie compression algorithm during said building step.
4. The invention in accordance with claim 3 wherein said next-hop table entries comprise said address field containing said IP address of said matching entry identified in said searching step, and an opaque data field for storing specialized packet processing information.
5. The invention in accordance with claim 4 wherein said next-hop table entries further comprise a mask length field containing a mask length of said entry, and said method further comprises the step of verifying that said address of said matching entry and said destination address of said information packet match to at least said mask length.
6. The invention in accordance with claim 5 wherein said next-hop table entries further comprise a next-hop backup offset field that references a previous entry in the hierarchy created in the building step, and said method further comprises a second step of verifying

performed if said verifying step fails, that verifies that said address of said previous entry
5 and said destination address of said information packet match to at least a mask length
number of bits of said previous entry.

7. The invention in accordance with claim 4 wherein said opaque data field further comprises MPLS tags.
8. The invention in accordance with claim 4 wherein said opaque data field further comprises quality of service parameters.
9. The invention in accordance with claim 4 wherein said opaque data field further comprises encryption handling parameters.
10. The invention in accordance with claim 4 wherein said addresses comprise IP addresses, and said opaque data field further comprises VLAN tags.
11. The invention in accordance with claim 4 wherein said opaque data field further comprises a port specific field for accessing said forwarding address identified in said transmitting step.
12. The invention in accordance with claim 11 wherein said addresses are IP addresses.

13. The invention in accordance with claim 12 wherein said next-hop table entries further comprise a flag field wherein if said flag is set said port specific field contains an offset to an entry in said next hop table containing said forwarding IP address indicating said forwarding IP address addresses a network route, and if the flag is not set said port specific field contains said forwarding IP address indicating said forwarding IP address addresses a host route.

14. The invention in accordance with claim 1 wherein said computer system comprises a network processor with a core processor and at least one microengine, and said primary computing element is said core processor and said secondary computing element is said microengine.

15. The invention in accordance with claim 14 wherein said step of building said table is performed by said forwarding table manager on said core processor, and said step of searching said table is performed on said microengine by said forwarding table manager.

16. A method of forwarding information packets operating on a multiple element computer system having a network processor with a core processor and at least one microengine, said method comprising:

providing a multiple element computing system having a network processor with a core
processor and at least one microengine in operative communication with each other;
building an LC-Trie search table and a corresponding next-hop table comprised of a
plurality of entries with IP addresses associated therewith:

wherein said LC-Trie table comprises a branching factor, a skip value, and an
LC-Trie/Next-Hop Offset generated for each of said plurality of entries by an LC-
Trie compression algorithm that hierarchically organizes said entries; and
wherein said next-hop table entries comprise:

said IP addresses with a mask length;
a destination IP address associated therewith;
a next-hop backup offset field for locating a previous entry in said next-
hop table;
an opaque data field for storing specialized packet processing information,
comprising, a port specific field, a VLAN tags, quality of service
parameters, and encryption handling parameters; and
a flag field wherein if said flag is set said port specific field contains an
offset to an entry in said next hop table containing a forwarding IP address
indicating said forwarding IP address addresses a network route, and if the
flag is not set said port specific field contains said forwarding IP address
indicating said forwarding IP address addresses a host route;

receiving an information packet within said computer system wherein said information
25 packet has a destination IP address associated therewith;

searching said LC-Trie table using an LC-Trie search algorithm to find a match between
said IP address of said corresponding entry in said next-hop table and said destination IP
address of said information packet;

verifying that said IP address of said matching entry and said destination IP address of
30 said information packet match to at least said mask length;

verifying, if said pervious verifying step fails, that said IP address of said previous entry
and said destination IP address of said information packet match to at least a mask length
number of bits of said previous entry represented by said entry in said next-hop backup
offset field;

35 transmitting said information packet to said forwarding IP address associated with said IP
address of said matching entry; and

wherein said steps of said method are performed by a forwarding table manager, wherein
said step of building said table is performed by said forwarding table manager on said
core processor, and said step of searching said table is performed on said microengine by
40 said forwarding table manager.